CLAIMS:

We claim:

1. A method for the manufacture of a free standing segmented nanoparticle by the deposition of a plurality of materials inside a template comprising:

   a) causing deposition of a first material into the pores of said template;

   b) causing deposition of a second material into the pores of said template; and

   c) releasing said segmented nanoparticles from said template.

2. The method of claim 1 wherein said segmented nanoparticle has a length from 10 nm to 50 μm and the nanoparticle width is from 5 nm to 50 μm.

3. The method of claim 2 wherein said segmented nanoparticle is comprised of 2-50 segments, wherein the particle length is from 1-15 μm, the particle width is from 30 nm to 2 μm, and the length of said segments is from 50 nm to 15 μm.

4. The method of claim 1 wherein said first and second materials are selected from the group consisting of a metal, a metal chalcogenide, a metal oxide, a metal sulfide, a metal selenide, a metal telluride, a metal alloy, a metal nitride, a metal phosphide, a metal antimonide, a semiconductor, a semi-metal, an organic compound or material, a inorganic compound or material, a particulate layer of material and a composite material.

5. The method of claim 1 wherein said first or second material is a metal.

6. The method of claim 5 wherein said metal is selected from the group consisting of silver, gold, copper, nickel, palladium, platinum, cobalt, rhodium, and iridium.

7. The method of claim 1 wherein said template is selected from the group consisting of an Al_2O_3 membrane, a photolithographically prepared template, a porous polycarbonate membrane, a zeolite and a block copolymer.

8. The method of claim 1 wherein the deposition of said first or second material is done by electrochemical deposition.

9. The method of claim 8 wherein an electrode is placed on or in proximity to one surface of said template, and said template is placed in contact with a first plating solution to deposit said first material, and is placed in contact with a second plating solution to deposit said second material.

10. A method for the manufacture of a nanoparticle by the electrochemical deposition of a metal inside a template comprising:

a) placing an electrode on or in proximity to one surface of said template;

b) placing said template into contact with a plating solution;

c) applying an electrical current to said solution in order to cause electrochemical deposition of said metal into the pores of said template; wherein said solution is agitated and maintained at a controlled temperature.

11. The method of claim 10 wherein said segmented nanoparticles has a length from 10 nm to 50 μm and the nanoparticle width is from 5 nm to 50 μm.

12. The method of claim 11 wherein said segmented nanoparticle is comprised of 2-50 segments, wherein the particle length is from 1-15 μm, the particle width is from 30 nm to 2 μm, and the length of said segments is from 50 nm to 15 μm.

13. The method of claim 10 wherein one of said metals is selected from the group consisting of silver, gold, copper, nickel, palladium, platinum, cobalt, rhodium, and iridium.

14. The method of claim 10 wherein said template is selected from the group consisting of an Al_2O_3 membrane, a photolithographically prepared template, a porous polycarbonate membrane, a zeolite and a block copolymer.

15. A method for the simultaneous manufacture of a plurality of different types of segmented nanoparticles by deposition of a plurality of materials inside a plurality of templates comprising:

causing the first deposition of a first material into the pores of all or some of the templates;

causing the second deposition of a second material into the pores of all or some of the templates; and

control means for determining whether and to what extent a first or second deposition occurs at a specific template is according to preselected values.

16. The method of claim 15 further comprising the step:

releasing said segmented nanoparticles from said templates.

17. The method of claim 15 wherein said segmented nanoparticles have a length from 10 nm to 50 μm and the nanoparticle width is from 5 nm to 50 μm.

18. The method of claim 17 wherein said segmented nanoparticle is comprised of 2-50 segments, wherein the particle length is from 1-15 μm, the particle width is from 30 nm to 2 μm, and the length of said segments is from 50 nm to 15 μm.

19. The method of claim 15 wherein said materials are selected from the group consisting of a metal, a metal chalcogenide, a metal oxide, a metal sulfide, a metal selenide, a metal telluride, a metal alloy, a metal nitride, a metal phosphide, a metal antimonide, a semiconductor, a semi-metal, an organic compound or material, a inorganic compound or material, a particulate layer of material or a composite material.

20. The method of claim 15 wherein said first or second material is a metal.

21. The method of claim 21 wherein one of said metals is selected from the group consisting of silver, gold, copper, nickel, palladium, platinum, cobalt, rhodium, and iridium.

22. The method of claim 15 wherein said template is selected from the group consisting of an Al_2O_3 membrane, a photolithographically prepared template, a porous polycarbonate membrane, a zeolite and a block copolymer.

23. The method of claim 15 wherein the deposition of said first or second material is done by electrochemical deposition.

24. The method of claim 23 wherein an electrode is placed on or in proximity to one surface of said templates, and said templates are placed in contact with a first plating solution to deposit said first material on all or some of the templates, and is placed in contact with a second plating solution to deposit said second material on all or some of the templates.

25. An apparatus for the manufacture of a nanoparticle comprising:

a plating solution chamber;

a defined-pore size template;

means for applying a current to cause electrochemical deposition within the pores of said template;

means for agitating solution within said plating solution chamber; and

means for controlling the temperature of said plating solution chamber.

26. The method of claim 25 wherein said template is selected from the group consisting of an Al_2O_3 membrane, a photolithographically prepared template, a porous polycarbonate membrane, a zeolite and a block copolymer.

27. An apparatus for the simultaneous manufacture of a plurality of different types of nanobar codes comprising:

a plating solution chamber;

a plurality of templates or a template with a plurality of regions;

means for selectively applying an electrical current to said regions or said templates; and

control means for controlling where and to what extent deposition will occur.

28. The method of claim 27 wherein said template is selected from the group consisting of an Al_2O_3 membrane, a photolithographically prepared template, a porous polycarbonate membrane, a zeolite and a block copolymer.

29. A method for the simultaneous manufacture of a plurality of different types of nanoparticles comprising:

identifying the size, shape and composition of each type of nanoparticles to be manufactured;

Controlling the simultaneous production of said nanoparticles so that each said type of nanoparticles is prepared at a defined location.

30. The method of claim 29 wherein said nanoparticles are segmented.

31. The method of claim 30 wherein said segmented nanoparticles are comprised of a plurality of materials.

32. The method of claim 31 where in said materials are selected from the group consisting of a metal, a metal chalcogenide, a metal oxide, a metal sulfide, a metal selenide, a metal telluride, a metal alloy, a metal nitride, a metal phosphide, a metal antimonide, a semiconductor, a semi-metal, an organic compound or material, a inorganic compound or material, a particulate layer of material or a composite material.

33. The method of claim 32 wherein at least one of said materials is a metal.

34. The method of claim 33 wherein said metal is selected from the group consisting of silver, gold, copper, nickel, palladium, platinum, cobalt, rhodium, and iridium.

35. The method of claim 30 wherein said segmented nanoparticles have a length from 10 nm to 50 μm and nanoparticle width is from 5 nm to 50 μm.

36. The method of claim 35 wherein said nanoparticles are comprised of 2-50 segments, wherein the particle length is from 1-15 μm, the particle width is from 30 nm to 2 μm, and the length of said segment is from 50 nm to 50 μm.